Internship on Cellular Automata: Theory and Applications

Preliminaries Required:
- Set, Relation, Mapping, Group, Sub-Group, Field, Ring, Partially Ordered Set, Lattice
- Linear Algebra and Matrices
- Basic Programming and Digital Logic

Unit I: Introduction to Cellular Automata
Lattice, Parallel Map, Definition of Cellular Automaton, Configuration - Finite and Periodic Brief History of CA, Game-Of-Life, Elementary Cellular Automata (ECA)
- *Mathematical and Programming Assignment*

Unit II: Finite Cellular Automata
Boundary Condition, Transition Diagram, Space-Time Diagram, Linear Cellular Automata, Matrix Algebra
- *Mathematical and Programming Assignment*

Unit III: Global Properties of Cellular Automata
Invertibility and Reversibility, Garden-Of-Eden, Chaos and Randomness, Conservation Laws, Computational Tasks, Wolfram's Classification
- *Programming Assignment*

Unit IV: Non-uniformity in Cellular Automata
Non-uniform ECA, Asynchronous Cellular Automata (ACAs), Implementation of Cellular Automata, Programmable CA, Maximal-length Cellular Automata, Cellular Automata as Technology
- *Programming and Digital Assignment*

Mini Project